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Comments to the Joint Legislative Conservation Committee on the Status of the Coal Refuse Reclamation to Energy Industry

On behalf of the
Appalachian Region Independent Power Producers Association
(ARIPPA)

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On behalf of ARIPPA, I want to thank the Joint Legislative Conservation Committee (JLCC) for scheduling this hearing to discuss the coal refuse reclamation to energy industry. Much of the information presented here is explained in more detail in the June 2019 Econsult Solutions study "The Coal Refuse Reclamation to Energy Industry: A Public Benefit in Jeopardy." This builds upon their 2016 study "Economic and Environmental Analysis of Pennsylvania's Coal Refuse Industry." Both reports are available on the ARIPPA website at www.arippa.org.

As we discuss the status of the coal refuse reclamation to energy industry, we cannot forget about the critical role the industry plays in addressing the legacy of the early coal mining industry by remediating coal refuse sites that scar the landscape, pollute our waterways, and constitute a continuing risk to the health and safety of our local communities. Today, I will address not just challenges faced by the coal refuse reclamation to energy industry in today's energy market and the potential impact of Pennsylvania joining the Regional Greenhouse Gas Initiative (RGGI), but discuss the economic and environmental benefits to Pennsylvania residents and taxpayers, which are gravely at risk if the industry were to disappear due to the multitude of market and regulatory challenges currently faced by the industry.

ARIPPA's membership is comprised of electric generating facilities located in Pennsylvania and West Virginia that provide environmental remediation of coal refuse sites by utilizing circulating fluidized bed (CFB) boiler technology to convert coal refuse into electricity and use the resulting beneficial use ash to reclaim the polluted sites where the coal refuse was removed. Pennsylvania's coal refuse plants span both the anthracite and bituminous coal regions and support the local economies of small communities across eight counties. In 2016, there were 14 facilities located in Pennsylvania between the anthracite and bituminous coal regions. Thirteen of the plants were first generation, with one second generation plant (Seward) built to a larger size and processing a higher volume than the first generation plants. Although relatively small in size, these facilities had a total generation capacity in excess of 1,400 megawatts.

For over two decades, ARIPPA member plants have collaborated with environmental groups, such as the Eastern Pennsylvania Coalition for Abandoned Mine Reclamation (EPCAMR), Western Pennsylvania

Coalition for Abandoned Mine Reclamation (WPCAMR), and Earth Conservancy. For example, ARIPPA member Olympus Power, Panther Creek Power, and Keystone Fuels Reclamation, LLC recently partnered with EPCAMR, the Pennsylvania Department of Environmental Protection's (PADEP) Bureau of Abandoned Mine Reclamation (BAMR), and the U.S. Department of Interior's Office of Surface Mining Reclamation and Enforcement (OSMRE) on a project to remove a 4 million-ton pile of coal refuse on a 55-acre site in the borough of Swoyersville, Luzerne County, on the historic grounds of the former Harry E. Breaker and Colliery called the Swoyersville Culm Pile AML Pilot Project. This project is funded in part through $4 million from the federal AML Pilot Program to EPCAMR, with an additional $8 million private investment from the coal refuse reclamation to energy company. ARIPPA has also funded grants to watershed groups throughout Pennsylvania and provided over $80,000 in donations in the last decade to support on the ground reclamation, remediation, cleanup support, watershed community support on issues related to abandoned mine land (AML) reclamation and abandoned mine drainage (AMD) remediation. Without the coal refuse reclamation to energy industry, coal refuse piles like Swoyersville would indefinitely continue to pollute the land and water across Pennsylvania.

The coal refuse reclamation to energy industry represents a unique paradigm for mine land reclamation in which environmental and economic objectives overlap. Prior to the development of CFB technology, there was no productive use for coal refuse. As a result, these hazardous piles littered the local landscapes and polluted nearby land and water for decades. Due to the costs associated with the removal of coal refuse and fiscal constraints governing public funding, the threats posed by these piles are mostly backburner issues for government authorities unless or until the mounds suddenly combust and become an immediate health and safety threat to nearby residents.

The Commonwealth is typically forced to address the environmental impacts of coal refuse piles on a reactive, rather than proactive basis, due in part to the cost structure of remediation for the state government relative to the coal refuse reclamation to energy industry. The industry, on the other hand, has developed a comprehensive fuel cycle approach to the problem. By removing coal refuse piles from the

environment, reclaiming the sites to productive uses and using the refuse as an alternative fuel for the production of electricity, the coal refuse reclamation to energy industry provides a range of environmental, economic, and societal benefits to the Commonwealth.

Since the late 1980s when the first CFB facilities were built, the plants making up Pennsylvania's coal refuse reclamation to energy industry have removed and burned as fuel more than 225 million tons of coal refuse, improved or restored more than 1,200 miles of stream and reclaimed more than 7,200 acres of abandoned mine lands (AML). When running at near full capacity, these plants can remove more than 10 million tons of coal refuse and reclaim over 200 acres per year. In addition to these environmental benefits, the industry also provides much needed employment opportunities and a solid economic impact to our rural communities.

Still, the inventory of coal refuse piles maintained by the PADEP's BAMR, which is acknowledged to be non-comprehensive, identified 772 piles of coal refuse as of June 2019 scattered across the anthracite and bituminous coal regions of Pennsylvania, which are estimated to consist of at least 220 million tons of coal refuse and to cover nearly 8,300 acres. These coal refuse piles cause numerous environmental and public safety hazards, depress property values, and prevent land from being returned to productive use. There were also 45 identified burning coal refuse fires in Pennsylvania, which can burn for decades if left unaddressed. These fires give rise to substantial, uncontrolled emissions of air pollution. Fires that can spread must be contained at considerable cost, such as the 2014 fire at Simpson Park in Lackawanna County, which required 1.6 million gallons of water daily to contain and was extinguished at a cost to the state of nearly $2.2 million.

Together, abandoned mine issues, including coal refuse piles, impact nearly 5,000 miles of Pennsylvania streams. Importantly, the local streams impacted by AMD are located within, or extend to, all four of Pennsylvania's major river basins and are ultimately carried from local waterways into the Chesapeake Bay and Delaware River Watersheds to the east and the Ohio, Mississippi, and Gulf of Mexico Watersheds to the west – creating environmental impacts that are national in scope. AMD is the second

largest contributor to pollution of the Chesapeake Bay coming from Pennsylvania. Unlike water treatment systems or simple grading and planting to cover piles, the elimination of coal refuse piles and reclamation of sites by coal refuse reclamation to energy facilities permanently removes the source of AMD and its associated environmental consequences.

A 2017 study of the Blacklick Creek watershed in Cambria County by the PADEP found that reclamation of five refuse piles using CFB ash had greatly diminished the loadings of pollutants to the watershed. During the reclamation projects completed by the Ebensburg Power Company and Colver Power Project, nearly 9 million tons of coal refuse were removed from the sites and 12 million tons of ash were placed as part of the remediation process. The process reclaimed 56 acres of land and restored aquatic life to 6 miles of the South Branch of Blacklick Creek. As the refuse piles were reclaimed the pH of Blacklick Creek downstream of the project sites reached parity with the pH upstream of the piles. Through reclamation, water runoff at the site saw reductions of 96 percent acidity, 99 percent iron, 94 percent aluminum, 87 percent manganese and 82 percent sulfate. The success at the South Branch demonstrates the effectiveness of coal refuse reclamation to improve local watersheds for long-term.

In addition to permanently removing the refuse pile and restoring the health of the South Branch of the Blacklick Creek, these efforts returned the land to the community for economic and recreational uses. The reclamation and remediation successfully restored local water quality and brought aquatic life back to the South Branch of Blacklick Creek. The southern fork of the creek, which ran through the pile, has been stocked with trout by a private sportsman group and can now be enjoyed for fishing and recreation. This project would not have been completed without the availability of these two coal refuse reclamation to energy facilities.

The remediation efforts of the industry are the product of a long-standing collaboration with the Commonwealth, which closely monitors these sites. The coal refuse is removed from these blighted areas and transported to the facilities where it is used to produce energy – offsetting mining and transportation costs – and beneficial use ash is then returned to mining sites for remediation and restoration. The

Commonwealth, by contrast, cannot generate energy and attendant revenue with coal refuse, does not have beneficial ash available for reclamation, and most crucially, must pay to safely remove, transport, and dispose of the coal refuse in a new location. As a result, the remediation activities of the industry are far more cost effective than those of the Commonwealth and result in a greater volume of environmental remediation.

Unfortunately, the industry is not fully compensated for the positive externalities resulting from its work which addresses public environmental liabilities. In recent years, market and regulatory forces have rendered revenues insufficient to cover costs for many plants. These forces have already resulted in the closure of multiple plants and they threaten the sustainability of the environmental and economic benefits that the industry provides.

Today, there are only 10 plants operating in Pennsylvania with a net operating capacity of just under 1,200 megawatts. These plants continue to play a critical role in environmental remediation by removing abandoned coal refuse piles and cleaning-up the land and water polluted by the piles with minimal to no cost to the taxpayers. However, the number of tons of coal refuse remediated continues to decline due to economic hardships and plant closures. At historic operating levels, the industry would generally remove and consume 10-12 million tons of coal refuse annually, improving numerous waterways in the process. However, plant closures and idling have led to an overall reduction in the volume of coal refuse consumed by plants. Thus, in recent years, plants have only consumed closer to 8 million tons of coal refuse annually. While energy production has sadly plummeted in recent years due to market and regulatory changes, this reduction in activity results in corresponding reductions in economic and environmental benefits.

Once a coal refuse reclamation to energy plant is deactivated, it is unlikely to ever reopen and in most cases is demolished within a short time following closure. As these facilities continue to disappear, under today's economic conditions and environmental regulations no new plants will ever be constructed to process and reclaim these coal refuse piles. Absent continued industry activity due to the loss of these

facilities, the Commonwealth and its citizens will permanently lose out on these public benefits and bear additional environmental liability, creating a net loss in value.

Recognizing the importance of the industry and the external benefits that it delivers to the state, Pennsylvania has attempted to help support these plants in a number of ways. The Alternative Energy Portfolio Standards (AEPS) program recognizes coal refuse energy as a Tier II alternative energy source. However, the weighted average price for Tier II AEPS credits since 2008 has been only $0.25 per credit. To put this in context, Tier I credits have averaged $8.00 per credit and Solar credits averaged $142 per credit.

In 2016, the General Assembly and Governor Wolf approved the Coal Refuse Energy and Reclamation Tax Credit to support the reclamation and consumption of coal refuse, acknowledging it as a beneficial environmental option to improve the Commonwealth's scarred and polluted landscape. Under the program, eligible facilities may receive up to a credit of $4 per ton of coal refuse used to generate electricity in the Commonwealth. Awards under the state tax credit have thus far been below eligible levels due to the total program cap of $10 million, averaging only $1.20 per ton in 2018. In June of 2019, the program cap for the state tax credit was increased to $20 million, which should at least double the value of the credit per ton of coal refuse consumed, but unfortunately still falling short of funding the full $4 per ton credit.

As described throughout the 2019 Econsult Report, Pennsylvania's coal refuse reclamation to energy industry has served for nearly three decades as a valuable environmental remediation tool for the Commonwealth. The industry has made significant progress on the issue of Pennsylvania's legacy coal refuse and the attendant environmental problems. However, recent changes in the market and regulatory conditions faced by the industry have created an existential crisis for this industry, in which its primary commodity – energy – regularly sells for lower than the cost of production.

The coal refuse industry is facing a number of regulatory and marketplace challenges, threatening the viability of its work reclaiming and remediating abandoned mine lands in Pennsylvania. Basic economics dictate that the revenue received for each megawatt hour (MWh) of energy must be sufficient to cover the

costs of production in order for that unit to be produced. However, due in large part from renewable subsidies and to the abundant availability of below market price natural gas, current market conditions often fail to meet this standard driving prices below the cost of energy generation for the coal refuse reclamation to energy industry, which already has elevated operating costs for re-mining, limestone, and trucking due to the fuel source and costly remediation and bonding obligations unique to the industry.

This dynamic creates an existential crisis for the industry, threatening the environmental and public benefits that it produces. There are two main revenue streams for coal refuse reclamation to energy plants:

1) Wholesale Energy revenue from selling energy generated by a plant; and

2) Capacity Payment revenue from a plant's commitment to serve as an on-call source of energy supply.

When wholesale prices are above the variable costs to generate each unit of energy, operators are incentivized to maximize their energy production. However, since mid-2015, wholesale energy prices have usually been below the typical "breakeven" point required by coal refuse reclamation to energy plants simply to recover their cost of production. It is economically sensible in the short run for some plants to remain in operation, rather than shutting down operations entirely. However, energy prices vary seasonally and plants may be idle for extended periods if market conditions result in prices dropping below economically viable levels.

Current conditions in the PJM market serving Pennsylvania do not provide sufficient incentives for most ARIPPA plants to operate at full capacity. This results in significant reductions in coal refuse removal and consumption at most plants. Meanwhile, capacity payments are set years in advance of the delivery date in order to provide an incentive for investments in plant assets and fixed costs. Again, PJM's capacity market "Base Residual Auction" for the region covering most of Pennsylvania fell significantly for the period beginning June 1, 2019, and will fall even lower this year. This level of payment further erodes the bottom line for plants and threatens reliability when they are forced to defer needed investment and maintenance.

Many ARIPPA plants are therefore forced to idle operations for portions of the year due to lower energy prices. For example, in recent years many of Pennsylvania's coal refuse plants were operating in a "cycling" mode, running only when energy prices were sufficient to recover costs and idling when the cost to operate exceeded pricing. This dynamic is responsible for declines in production levels and economic activity already underway. Without a sustainable model to yield viable returns, plants will ultimately close, eliminating the significant environmental benefits currently delivered by the industry.

In addition to changes in market conditions, coal refuse plants face challenges from new federal and state regulations that increase capital and operating costs for plants. New federal pollution regulations account only for the negative environmental externalities of coal refuse plants and not the environmental benefits of their remediation work, subjecting the industry to an asymmetrical regulatory environment. These economic and regulatory challenges put the industry, its employees and all Pennsylvanians benefitting from its environmental activities in a tenuous position.

A recent regulatory development in Pennsylvania which could have considerable bearing upon the future of the coal refuse reclamation to energy industry is the proposal by Governor Wolf that Pennsylvania join RGGI. On October 3, 2019, the governor signed Executive Order 2019-7 instructing the PADEP to join RGGI, a market-based collaboration among nine Northeast and Mid-Atlantic states imposing a cap and trade program on carbon dioxide (CO2) emissions from fossil fuel-fired power plants. RGGI is composed of individual CO2 Budget Trading Programs in each participating state. Through independent regulations, based on the RGGI Model Rule, each state's CO2 Budget Trading Program limits emissions of CO2 from fossil fuel-fired power plants, issues CO2 allowances and establishes participation in regional CO2 allowance auctions.

Under the RGGI Model Rule, fossil fuel-fired electric power generators with a capacity of 25 megawatts (MW) or greater ("regulated sources") are required to hold allowances equal to their CO2 emissions over a three-year control period. A CO2 allowance represents a limited authorization to emit one

short ton of CO2 from a regulated source. Generally, regulated sources must acquire allowances at considerable cost by purchasing them at regional auctions or through secondary markets.

However, the coal refuse reclamation to energy facilities are distinctly different from traditional fossil fuel-fired power plants. The remediation activities of the industry deliver documented benefits to the environment, the Commonwealth, and the public at large relative to the probable alternative of leaving coal refuse piles unaddressed. These benefits include water quality improvements, public health and safety benefits, and air quality impacts from the elimination of fugitive dust and refuse pile fires. For example, coal refuse pile reclamation by coal refuse reclamation to energy facilities reduces uncontrolled emissions from burning coal refuse piles and creates carbon sinks by removing coal refuse and restoring vegetation to AML sites. While these environmental benefits are substantial in economic terms, they are not captured within the industry's business model. Rather, they are "positive externalities" that accrue to the general public.

Coal refuse reclamation to energy facilities would potentially be subject to the carbon cap and trade program proscribed under the RGGI Model Rule. The result of this would be a significant increase in the operating cost of these facilities with allowances projected to cost as much as $12 per megawatt of energy produced at these facilities. Such an increase, particularly considering current pricing in the PJM energy market, would lead to the immediate closure - and loss of the attendant environmental benefits - of every coal refuse reclamation to energy facility in the state.

Since each state participating in RGGI must enact independent regulations creating an acceptable cap and trade program, Pennsylvania would have the option to take into account the "positive externalities" of the industry should the state at any time in the future enact regulations to join RGGI or adopt any type of carbon cap and trade program. This would allow Pennsylvania to take into consideration the unique environmental nature of coal refuse reclamation to energy facilities, particularly considering these facilities do not exist in any current RGGI state. The environmental benefits resulting from the reclamation of coal refuse piles should be sufficient to justify an exemption, exclusion, or other mechanism

to safeguard these facilities from the financial burden that would be placed upon them under such a program.

The environmental activities of the coal refuse industry deliver benefits to Pennsylvania and its residents across a number of categories. These activities yield quantifiable benefits in terms of air and water quality, public safety, and land value estimated to total over $9 million in just one year. Further, many of these benefits compound over time, with remediated areas continuing to deliver benefits in terms of avoided costs to state and local government on an ongoing basis. Benefits are estimated to grow to nearly $65 million by year 20, totaling almost $740 million and averaging $36.9 million per year over a twenty-year period.

To achieve the benefits described previously without the industry, the state could alternatively commission the removal of piles, disposal of coal refuse, and rehabilitation of sites. The cost of this effort to the state represents the “avoided cost” from activity that is instead undertaken by the industry. Combined, estimated disposal and removal costs range from around $11 per ton in the most ideal situation to around $33 per ton under more typical conditions. Rehabilitation costs represent an additional $20,000 - $23,000 per acre. At these costs, replicating the annual removal of 8 million tons of refuse and remediation of 240 acres generated by the industry would cost Pennsylvania $93 to $267 million annually. Addressing all identified piles across the state would cost $2.6 to $7.4 billion.

While converting coal refuse to energy is not currently viable as a market-based means of energy production, it remains a valuable and cost-effective means of environmental remediation that delivers a strong public return on investment. A public investment to maintain the viability of the industry would be far smaller relative to the costs that would be borne by Pennsylvania taxpayers to address the remaining coal refuse piles through state cleanup efforts or the public costs of inaction in the form of water quality, public health and safety and land value losses. Without the coal refuse reclamation to energy industry, the Commonwealth cannot afford to clean up these coal refuse piles.

Not only has Pennsylvania's coal refuse reclamation to energy industry saved the Commonwealth millions of dollars in environmental clean-up costs, but the industry is also a major economic generator and employer for Pennsylvania. Direct expenditures by the industry are estimated at $363 million annually, and industry employees earn an average salary of greater than $75,000. Each of these expenditures, which represent the direct footprint of the industry, in turn create indirect and induced "spillover" effects within the economy. Including spillover effects, the annual economic impact of the industry in Pennsylvania is $615 million, supporting nearly 3,000 jobs and generating $18 million in state taxes and fees.

The coal refuse reclamation to energy industry is a unique private-public partnership that allows our facilities to generate electricity and at the same time restore the environment of the Commonwealth. The industry is historically the most effective and prolific actor in the remediation of coal refuse piles across Pennsylvania. However, the current economics of the industry are unsustainable and without some intervention will lead to further plant closures and a permanent loss of their public environmental and economic benefits.

We need to strengthen our partnership whereby the state and federal government help us to manage a portion of our fuel cycle costs in return for saving the taxpayers from bearing the inevitable cost of state funded remediation efforts to remove these environmentally threatening coal refuse piles. Government can assist the industry either through enhanced tax credit support or through a restructuring of the regulatory framework. Either approach would recognize and assign a financial value to the public benefits that are not currently realized within the industry economics.

A more substantial tax credit program would have the effect of lowering the "breakeven price" of generating each unit of energy for coal refuse to energy plants. Based on recent pricing trends, the full $4 per ton credit would increase the duration of periods in which plants could operate economically, while a $12 credit which has been proposed at the federal level would allow plants to operate continuously, maximizing the environmental benefits the industry provides. Unfortunately, a recent order issued by the Federal Energy Regulatory Commission regarding bid pricing in the PJM capacity auction limits the ability of

the state to support these facilities through this type of program going forward, thereby making other alternatives, like the federal tax credit, more feasible although challenging options to achieve.

Alternatively, power purchase agreements (PPAs) with local utilities, state or federal agencies could provide a reliable revenue stream to enable continued production and the associated environmental, economic and public benefits. Most of these facilities were constructed with PPAs under the Public Utility Regulatory Policies Act (PURPA), which required that electric utilities buy alternative energy generated by qualified facilities at an "avoided cost" rate. However, the final PPA for a coal refuse reclamation to energy facility in Pennsylvania expires in May of this year.

As previously mentioned, coal refuse is also a Tier II source under the Pennsylvania AEPS program. However, a glut of supply in Tier II led to a weighted average price per credit of only $0.16 in 2017, compared to the Tier I price of over $12. Like the state tax credit, at current levels this yield is insufficient to provide a meaningful incentive to achieve the program's purpose. Credits could potentially be adjusted between tiers or a distinct tier could be created that provides value through the program (or another mechanism) commensurate with the industry's contribution to the Commonwealth. By closing the program to out of state Tier II sources as was done for solar credits in 2017, credit prices would rise substantially as these sources comprise a sizeable portion of the AEPS credits available thereby diluting the market value.

In conclusion, while the coal refuse reclamation to energy industry is appreciative of your continued support, unfortunately our plants continue to struggle in the face of costly regulations and low energy prices. ARIPPA and our members want to continue partnering with environmental groups and public sector agencies to promote the values of reclamation and find ways to secure multiple sources of adequate funding that will sustain and increase the current level of mining-affected land reclamation activities. No one but the coal refuse reclamation to energy industry can remove the abandoned coal refuse piles and address these attendant environmental and safety hazards in a holistic, efficient, and permanent manner.

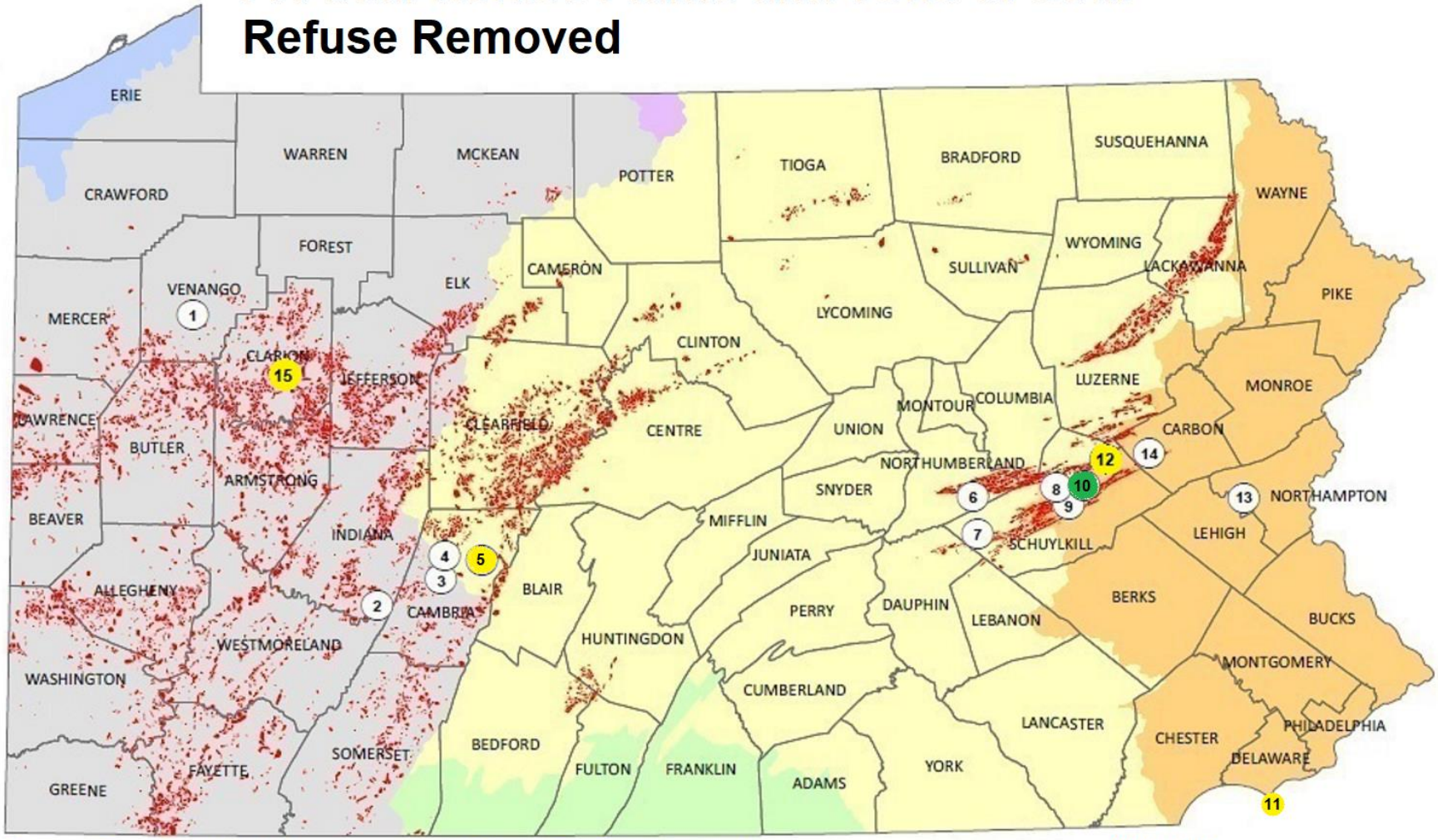
Thank you.

ARIPPA Plants by County

County	Plant	Net Operating Capacity (MW)	Year First Unit in Service	Tons of Coal Refuse Burned in 2018
Cambria	Cambria Cogeneration (Closed in 2019)	87	1991	536,977
Cambria	Colver Power Project	111	1995	657,410
Cambria	Ebensburg Power Company	50	1991	423,635
Carbon	Panther Creek Power	80	1992	159,995
Delaware	Kimberly Clark Chester Operations (Converted to natural gas in 2019)	67	1986	175,000 (est.)
Indiana	Seward Generation	521	2004	2,103,272
Northampton	Northampton Generating Company	112	1995	193,183
Northumberland	Mount Carmel Cogeneration	43	1990	577,962
Schuylkill	John B. Rich Memorial Power Station – Gilberton	80	1988	723,885
Schuylkill	Northeastern Power Cogeneration Facility (Closed in 2018)	52	1989	256,878
Schuylkill	St. Nicholas Cogeneration – SER	80	1990	1,529,810
Schuylkill	Westwood Generating Station	33	1987	369,593
Schuylkill	Wheelabrator Frackville Energy Company (Closing in March 2020)	42	1988	521,062
Venango	Scrubgrass Generating	83	1993	517,092
	TOTALS	**1193***		**8,745,754**

* Excluding closed and closing facilities

PA Coal Refuse Plants and Tons of Coal Refuse Removed



1. Scrubgrass Generating - 83 MW; 517,092 tons
2. Seward Generation - 521 MW; 2,103,272 tons
3. Ebensburg Power Company - 50 MW; 423,635 tons
4. Colver Power Project - 111 MW; 657,410 tons
5. Cambria Cogen Company - 87 MW; 536,977 tons [2019]
6. Mt. Carmel Cogen - 43 MW; 577,962 tons
7. Rausch Creek Generation - 33 MW; 369,593 tons
8. Schuylkill Energy Resources - 80 MW; 1,529,810 tons
9. Gilberton Power Company - 80 MW; 723,885 tons
10. Wheelabrator Frackville Energy Company - 42 MW; 521,062 tons [2020]
11. Kimberly Clark Chester Plant - 67 MW; N/A [2019]
12. Northeastern Power Company - 52 MW; 256,878 tons [2018]
13. Northampton Generating Company - 112 MW; 193,183 tons
14. Panther Creek Energy - 80 MW; 159,995 tons
15. Piney Creek LP - 32 MW; N/A [2013]

*MW = Net capacity; Tons of coal refuse removed in 2018

Watersheds

- Ohio
- Genesee
- Delaware
- Potomac
- Erie
- Susquehanna
- Abandoned Mine Land Problem Areas
- Closed
- Announced Closure